Section 1. Introduction

The Earth Observing System (EOS) Ground System (EGS) is the pivotal element of NASA's 20-year effort to support international research into the Earth's environment. With the Space System and the Scientific Research Program, the EGS will fulfill NASA's Mission to Planet Earth, a crucial part of the U.S. Global Change Research Program. Figure 1-1 shows the context of the EGS within the Mission to Planet Earth and the U.S. Global Change Research Program. The reader is urged to explore the web sites listed in Section 1.4 to obtain a broad background and context for EOS in the national and international science initiatives.

The EGS is the integrated system of NASA institutional services, hybrid capabilities, and EOS unique subsystems that provides test, launch, and on-orbit operations services. The key element of the EGS is the EOS Data and Information System (EOSDIS). EOSDIS will include Earth science data not only from EOS spacecraft but also from several other sources. It will provide command and control of EOS spacecraft and instruments and will process, archive, manage, and distribute the Earth sensing data and information to the research community.

Figure 1-2 shows the EGS and the internal relationships of its elements, including EOSDIS. For perspective, most of the solid colors of both boxes and lines denote unique capabilities developed for EGS by the ESDIS Project. The complexity of this diagram gives "just a first" impression of the complexity of the EGS architecture.

1.1 Purpose/Scope

The purpose of this EGS Architecture Description Document (ADD) is to describe the EGS architecture, including the hardware/software components and the communications connections among those components. Emphasis is placed on the unique and dedicated components and subsystems that make up the majority of the ground system. This ADD identifies components and interfaces and provides an end-to-end view of mission data flow. This document also addresses how design drivers influence the architecture of each system, segment, and subsystem that make up the total EGS. It describes data paths from the EOS instruments through the EGS components in which the data are communicated, stored, processed, and made available to instrument builders, investigators, scientists, scholars, operators, and the public.

This ADD is a complete revision of the original ADD (dated April 1993) and its March 1995 and June 1996 revisions and supersedes those documents. The contents of this ADD will be updated as the designs of the EGS components evolve.

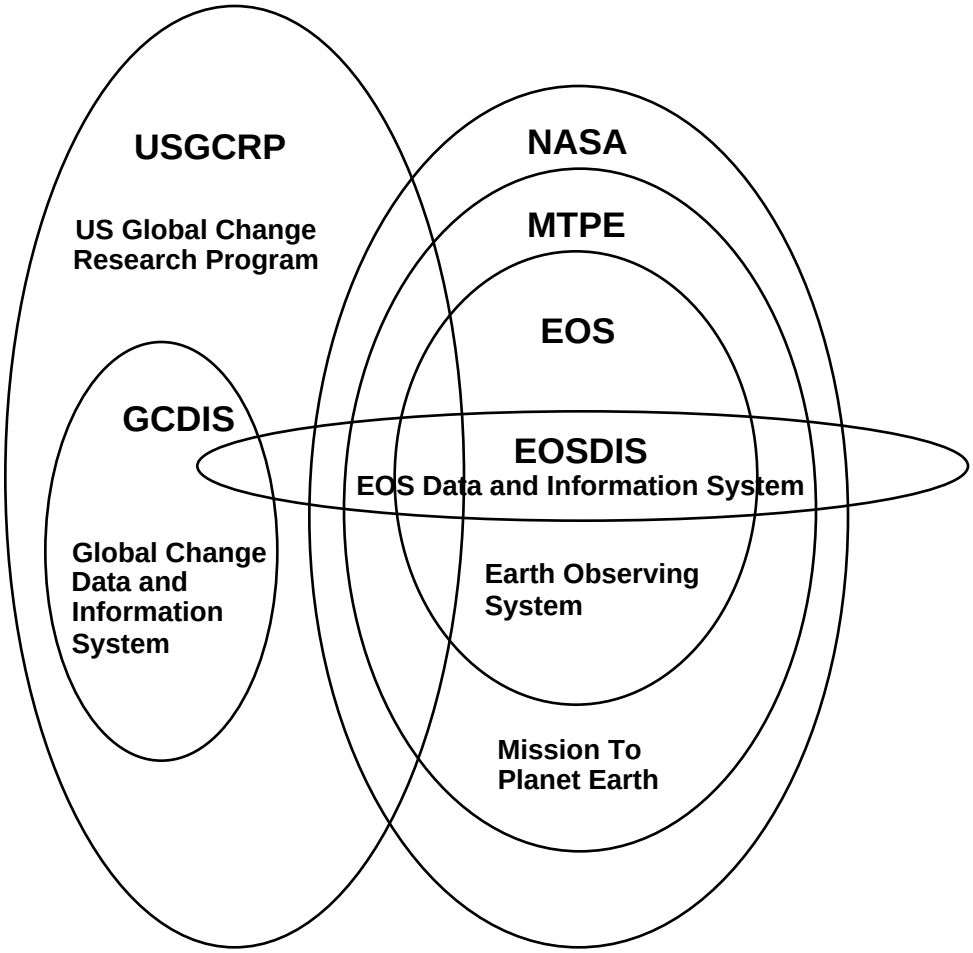

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Figure 1-1. Venn Diagram of EOS Mission

Figure 1-2. EOS Ground System

1.2 Document Organization

The ADD is organized into three major sections: Introduction, EOS Program Overview, and EGS Component Descriptions. In addition, appendices describe EGS support of EOS related missions and include other information, such as how the EGS is being developed and the philosophy behind that development. The sections are designed to aid the reader in understanding the scope and architecture of the EGS and how it is meant to be used.

Section 2 begins with an overview of the EOS Program. This section describes the EOS space system; the scientific research program and the user community; and the ground system. Section 3 provides the detailed description of the major EGS components, starting with the unique ones. Descriptions and design drivers are presented for the Science Data Processing System (SDPS), the EOS Operations Center (EOC), the EOS Data and Operations System (EDOS), the EOSDIS Backbone Network (EBnet), and then the NASA Institutional Support Systems (NISS). Section 3 also includes the EGS role in spacecraft development, test, and launch.

EGS supports many important science missions but provides services that are general in nature. For this reason, an architecture description does not readily refer to the supported missions, even though they are the reason for its existence. For completeness, Appendix A describes the role of the EGS in support of the Tropical Rainfall Measuring Mission (TRMM), Landsat-7, and Advanced Earth Observing System (ADEOS) missions. Appendix B provides additional information on the EOS spacecraft and instruments and characterization of the AM-1 mission. Appendix C describes the three major EOSDIS development efforts. A list of abbreviations and acronyms and a glossary of terms are also included.

1.3 Applicable Documents

The following documents were used to obtain data, background information, and interface specifications used throughout this document.

DOCUMENT NUMBER & DATE	DOCUMENT TITLE
NP-215, 8/95	1995 EOS Reference Handbook
GSFC 170-01-01, Rev. A, 5/95	Execution Phase Project Plan for EOS, Rev. A
SDP Ver. 4.0, 6/96	Science Data Plan for the EOSDIS
ECS 194-00131, 4/94	Defining the Architectural Development of EOSDIS to Facilitate Extension to a Wider Data Information System
505-XXX-94, 9/94	EOSDIS Integration and Certification Definition Document
423-10-01-0, 2/93	Overall ESDIS Project Requirements, Volume 0
423-10-01-1, 5/93	EOSDIS Core System (ECS), Volume 1

423-10-01-2, 3/92 EOS Data and Operations System (EDOS), Volume 2

515-4FRD/0294, 12/94 ETS Functional and Performance Requirements

_____, 7/96 EOS AM-1 Detailed Mission Requirements (DMR)

423-10-01-5, 9/93 EOSDIS Version Zero, Volume 5

423-10-01-6, 12/95 EOSDIS Backbone Network (EBnet), Volume 6

DN-SE&I-010, 6/93 Baseline Description Document for the EOS-AM Spacecraft

423-41-02 Ch. 12, 7/95 Functional and Performance Requirements Specification for the ECS

FB9401V2, 3/94 EOSDIS Core System Science Information Architecture

ECS 194-401-VE1-002, 6/94 Verification Plan for the ECS Project

319-CD-006-001/402-CD-003-001, 10/95 Release B System and Segment Integration and Test Plan for the ECS Project

604-CD-002-001/3, 10/95, 3/96 Operations Concept for ECS Project: ECS Release B

305-CD-040-001, 10/95 Flight Operations Segment Design Specification for the ECS Project

305-CD-020-002, 3/96 Release B SDPS/CSMS Design Specification Overview

560-EDOS 0202.0001, 12/92 Earth Observing System (EOS) Data and Operations System (EDOS) Functional and Performance Requirements

560-EDOS 0922.0001.R2, 3/94 Earth Observing System (EOS) Data and Operations System (EDOS) System Implementation Plan, Rev. 2

540-028, 5/96 EBnet Operations Concept Document

505-10-20, 9/95 System Interface Control Plan for the Earth Science Data and Information System (ESDIS) Project

_____, 6/96 EOS Ground System (EGS) System and Operations Concept

_____, 6/95	EOS Mission Operations Concept
STX/EOSDIS 91-01, 12/91	EOS Science Operations Concept
333-CD-001-002	SDP Toolkit Users Guide for the ECS Project
193-801-SD4-001, 10/93	PGS Toolkit Requirements Specification for the ECS Project, Final [A.K.A GSFC 423-06-02]

1.4 EOSDIS-Related World Wide Web Sites

Table 1-1 lists EOSDIS-related World Wide Web sites. Readers are urged to explore these web sites for information and understanding of the context of EOS and the global science and investigator communities.

Table 1-1. ESDIS-Related WWW Sites

EOSDIS-Related Homepage	URL	Contents
Mission to Planet Earth	http://www.hq.NASA.gov/office/mtpe	Information on missions, science, data access, news, publications, education
Earth Observing System Homepage	http://eos.nasa.gov/	Access to program information; NASA, DAACs, ECS servers information
Welcome to the Global Change Master Directory	http://gcmd.gsfc.nasa.gov/	Global change master directory, directory news, documentation; pointers to other servers
EOSDIS Information Management System (IMS) Homepage	http://harp.gsfc.nasa.gov:1729/eosdis_documents/eosdis_home.html	Information about EOSDIS IMS, EOSDIS data search and order tools, IMS documents, EOSDIS on display, and data product types and services
ESDIS System Management Office (SMO) Homepage	http://esdis.gsfc.nasa.gov/smo/smo.html	SMO schedules, documentation, briefings, presentations, activities, events, metrics, and information desk
EOSDIS Core System (ECS) ECS Information	http://ecsinfo.hitc.com/	ECS definition, newsletter, ECS at DAACs, prototypes, science data production, user feedback; link to ECS Data Handling System (EDHS) and Earth pages
EOSDIS Test System Homepage	http://esdis.gsfc.nasa.gov/ivv/ets.html	Information and status of the EOS Test System
EBnet Homepage	http://skynet.gsfc.nasa.gov/EBNET/EBnet.html	Documentation, EBnet traffic database, presentation material
EOSDIS	http://spsosun.gsfc.nasa.gov/EOSDIS_main.html	Information on EOSDIS, access to data and services, system architecture and technology, organizations, publications, activities, and schedules
EOS Project Science Office	http://eospso.gsfc.nasa.gov	EOS investigations, mission profiles, publications, education, directory, EOS-related servers
Science Data Plan	http://spsosun.gsfc.nasa.gov/spso/sdp/sdphomepage.html	Science data plan for EOSDIS Homepage